



Serial no: 09/635,027
Filed : August 4, 2000

--kappa B sequence on step 63 of original application was obtained from HIV-1
(nt 349-374, nt 9434- 9458) as shown on pages 8 and 11 of the sequence listing.

K03455. Human immunodeficiency virus type 1 [gi:1906382]

Related Sequences,

Protein, PubMed, Taxonomy

LOCUS HIVHXB2CG 9719 bp ss-RNA VRL 19-AUG-1999
DEFINITION Human immunodeficiency virus type 1 (HXB2), complete genome;
HIV1/HTLV-III/LAV reference genome.
ACCESSION K03455 M38432
VERSION K03455.1 GI:1906382
KEYWORDS TAR protein; acquired immune deficiency syndrome; complete genome;
env protein; gag protein; long terminal repeat (LTR); pol protein;
polyprotein; proviral gene; reverse transcriptase; transactivator.
SOURCE Human immunodeficiency virus type 1.
ORGANISM Human immunodeficiency virus type 1
Viruses; Retroviral viruses; Retroviridae; Lentivirus; Primate
lentivirus group.
REFERENCE 1 (bases 493 to 674; 9577 to 9718)
AUTHORS Ratner,L., Haseltine,W., Patarca,R., Livak,K.J., Starcich,B.,
Josephs,S.F., Doran,E.R., Rafalski,J.A., Whitehorn,E.A.,
Baumeister,K., Ivanoff,L., Petteway,S.R. Jr., Pearson,M.L.,
Lautenberger,J.A., Papas,T.S., Ghayeb,J., Chang,N.T., Gallo,R.C.
and Wong-Staal,F.
TITLE Complete nucleotide sequence of the AIDS virus, HTLV-III
JOURNAL Nature 313 (6000), 277-284 (1985)
MEDLINE 85111123
PUBMED 2578615
REFERENCE 2 (bases 1 to 653)
AUTHORS Starcich,B., Ratner,L., Josephs,S.F., Okamoto,T., Gallo,R.C. and
Wong-Staal,F.
TITLE Characterization of long terminal repeat sequences of HTLV-III
JOURNAL Science 227 (4686), 538-540 (1985)
MEDLINE 85090465
REFERENCE 3 (sites)
AUTHORS Allan,J.S., Coligan,J.E., Barin,F., McLane,M.F., Sodroski,J.G.,
Rosen,C.A., Haseltine,W.A., Lee,T.H. and Essex,M.
TITLE Major glycoprotein antigens that induce antibodies in AIDS patients
are encoded by HTLV-III
JOURNAL Science 228 (4703), 1091-1094 (1985)
MEDLINE 85192537
REFERENCE 4 (sites)
AUTHORS Sodroski,J., Patarca,R., Rosen,C., Wong-Staal,F. and Haseltine,W.
TITLE Location of the trans-activating region on the genome of human
T-cell lymphotropic virus type III
JOURNAL Science 229 (4708), 74-77 (1985)
MEDLINE 85244627
REFERENCE 5 (sites)
AUTHORS Arya,S.K., Guo,C., Josephs,S.F. and Wong-Staal,F.
TITLE Trans-activator gene of human T-lymphotropic virus type III
(HTLV-III)
JOURNAL Science 229 (4708), 69-73 (1985)

MEDLINE 85244626
REFERENCE 6 (sites)
AUTHORS van Beveren, C.P., Coffin, J. and Hughes, S.
TITLE Appendix B: HTLV-3/LAV genome
JOURNAL (in) Weiss, R.L., Teich, N., Varmus, H. and Coffin, J. (Eds.);
RNA TUMOR VIRUSES, SECOND EDITION, 2, Vol. 2: 1102-1123;
Cold Spring Harbor Laboratory, Cold Spring Harbor (1985)

REFERENCE 7 (sites)
AUTHORS Rosen, C.A., Sodroski, J.G. and Haseltine, W.A.
TITLE The location of cis-acting regulatory sequences in the human T cell
lymphotropic virus type III (HTLV-III/LAV) long terminal repeat
JOURNAL Cell 41 (3), 813-823 (1985)
MEDLINE 85228232

REFERENCE 8 (sites)
AUTHORS Rabson, A.B., Daugherty, D.F., Venkatesan, S., Boulukos, K.E.,
Benn, S.I., Folks, T.M., Feorino, P. and Martin, M.A.
TITLE Transcription of novel open reading frames of AIDS retrovirus
during infection of lymphocytes
JOURNAL Science 229 (4720), 1388-1390 (1985)
MEDLINE 85300515

REFERENCE 9 (sites)
AUTHORS Allan, J.S., Coligan, J.E., Lee, T.H., McLane, M.F., Kanki, P.J.,
Groopman, J.E. and Essex, M.
TITLE A new HTLV-III/LAV encoded antigen detected by antibodies from AIDS
patients
JOURNAL Science 230 (4727), 810-813 (1985)
MEDLINE 86044509

REFERENCE 10 (sites)
AUTHORS Rosen, C.A., Sodroski, J.G., Goh, W.C., Dayton, A.I., Lippke, J. and
Haseltine, W.A.
TITLE Post-transcriptional regulation accounts for the trans-activation
of the human T-lymphotropic virus type III
JOURNAL Nature 319 (6054), 555-559 (1986)
MEDLINE 86118720

REFERENCE 11 (sites)
AUTHORS di Marzo Veronese, F., Copeland, T.D., DeVico, A.L., Rahman, R.,
Oroszlan, S., Gallo, R.C. and Sarngadharan, M.G.
TITLE Characterization of highly immunogenic p66/p51 as the reverse
transcriptase of HTLV-III/LAV
JOURNAL Science 231 (4743), 1289-1291 (1986)
MEDLINE 86122937

REFERENCE 12 (sites)
AUTHORS Kan, N.C., Franchini, G., Wong-Staal, F., DuBois, G.C., Robey, W.G.,
Lautenberger, J.A. and Papas, T.S.
TITLE Identification of HTLV-III/LAV sor gene product and detection of
antibodies in human sera
JOURNAL Science 231 (4745), 1553-1555 (1986)
MEDLINE 86151663

REFERENCE 13 (sites)
AUTHORS Kramer, R.A., Schaber, M.D., Skalka, A.M., Ganguly, K., Wong-Staal, F.
and Reddy, E.P.
TITLE HTLV-III gag protein is processed in yeast cells by the virus
pol-protease
JOURNAL Science 231 (4745), 1580-1584 (1986)
MEDLINE 86151671

REFERENCE 14 (sites)
AUTHORS Lee, T.H., Coligan, J.E., Allan, J.S., McLane, M.F., Groopman, J.E. and

Essex, M.
 TITLE A new HTLV-III/LAV protein encoded by a gene found in cytopathic
 retroviruses
 JOURNAL Science 231 (4745), 1546-1549 (1986)
 MEDLINE 86151661
 REFERENCE 15 (sites)
 AUTHORS Dayton, A.I., Sodroski, J.G., Rosen, C.A., Goh, W.C. and Haseltine, W.A.
 TITLE The trans-activator gene of the human T cell lymphotropic virus
 type III is required for replication
 JOURNAL Cell 44 (6), 941-947 (1986)
 MEDLINE 86161683
 REFERENCE 16 (sites)
 AUTHORS Sodroski, J., Goh, W.C., Rosen, C., Tartar, A., Portetelle, D., Burny, A.
 and Haseltine, W.
 TITLE Replicative and cytopathic potential of HTLV-III/LAV with sor gene
 deletions
 JOURNAL Science 231 (4745), 1549-1553 (1986)
 MEDLINE 86151662
 REFERENCE 17 (sites)
 AUTHORS Arya, S.K. and Gallo, R.C.
 TITLE Three novel genes of human T-lymphotropic virus type III: immune
 reactivity of their products with sera from acquired immune
 deficiency syndrome patients
 JOURNAL Proc. Natl. Acad. Sci. U.S.A. 83 (7), 2209-2213 (1986)
 MEDLINE 86177573
 REFERENCE 18 (sites)
 AUTHORS Jones, K.A., Kadonaga, J.T., Luciw, P.A. and Tjian, R.
 TITLE Activation of the AIDS retrovirus promoter by the cellular
 transcription factor, Sp1
 JOURNAL Science 232 (4751), 755-759 (1986)
 MEDLINE 86179897
 REFERENCE 19 (sites)
 AUTHORS Sodroski, J., Goh, W.C., Rosen, C., Dayton, A., Terwilliger, E. and
 Haseltine, W.
 TITLE A second post-transcriptional trans-activator gene required for
 HTLV-III replication
 JOURNAL Nature 321 (6068), 412-417 (1986)
 MEDLINE 86230863
 REFERENCE 20 (sites)
 AUTHORS Starcich, B.R., Hahn, B.H., Shaw, G.M., McNeely, P.D., Modrow, S.,
 Wolf, H., Parks, E.S., Parks, W.P., Josephs, S.F., Gallo, R.C. and
 Wong-Staal, F.
 TITLE Identification and characterization of conserved and variable
 regions in the envelope gene of HTLV-III/LAV, the retrovirus of
 AIDS
 JOURNAL Cell 45 (5), 637-648 (1986)
 MEDLINE 86218077
 REFERENCE 21 (sites)
 AUTHORS Willey, R.L., Rutledge, R.A., Dias, S., Folks, T., Theodore, T.,
 Buckler, C.E. and Martin, M.A.
 TITLE Identification of conserved and divergent domains within the
 envelope gene of the acquired immunodeficiency syndrome retrovirus
 JOURNAL Proc. Natl. Acad. Sci. U.S.A. 83 (14), 5038-5042 (1986)
 MEDLINE 86259728
 REFERENCE 22 (bases 8761 to 9060)
 AUTHORS Fisher, A.G., Ratner, L., Mitsuya, H., Marselle, L.M., Harper, M.E.,
 Broder, S., Gallo, R.C. and Wong-Staal, F.

TITLE Infectious mutants of HTLV-III with changes in the 3' region and markedly reduced cytopathic effects
 JOURNAL Science 233 (4764), 655-659 (1986)
 MEDLINE 86261824
 REFERENCE 23 (sites)
 AUTHORS Feinberg, M.B., Jarrett, R.F., Aldovini, A., Gallo, R.C. and Wong-Staal, F.

TITLE HTLV-III expression and production involve complex regulation at the levels of splicing and translation of viral RNA
 JOURNAL Cell 46 (6), 807-817 (1986)
 MEDLINE 87002448
 REFERENCE 24 (sites)
 AUTHORS Lightfoote, M.M., Coligan, J.E., Folks, T.M., Fauci, A.S., Martin, M.A. and Venkatesan, S.

TITLE Structural characterization of reverse transcriptase and endonuclease polypeptides of the acquired immunodeficiency syndrome retrovirus
 JOURNAL J. Virol. 60 (2), 771-775 (1986)
 MEDLINE 87036947
 REFERENCE 25 (sites)
 AUTHORS Wright, C.M., Felber, B.K., Paskalis, H. and Pavlakis, G.N.

TITLE Expression and characterization of the trans-activator of HTLV-III/LAV virus
 JOURNAL Science 234 (4779), 988-992 (1986)
 MEDLINE 87042788
 REFERENCE 26 (sites)
 AUTHORS Terwilliger, E., Sodroski, J.G., Rosen, C.A. and Haseltine, W.A.

TITLE Effects of mutations within the 3' orf open reading frame region of human T-cell lymphotropic virus type III (HTLV-III/LAV) on replication and cytopathogenicity
 JOURNAL J. Virol. 60 (2), 754-760 (1986)
 MEDLINE 87036943
 REFERENCE 27 (sites)
 AUTHORS Goh, W.C., Sodroski, J.G., Rosen, C.A. and Haseltine, W.A.

TITLE Expression of the art gene protein of human T-lymphotropic virus type III (HTLV-III/LAV) in bacteria
 JOURNAL J. Virol. 61 (2), 633-637 (1987)
 MEDLINE 87112968
 REFERENCE 28 (sites)
 AUTHORS Modrow, S., Hahn, B.H., Shaw, G.M., Gallo, R.C., Wong-Staal, F. and Wolf, H.

TITLE Computer-assisted analysis of envelope protein sequences of seven human immunodeficiency virus isolates: prediction of antigenic epitopes in conserved and variable regions
 JOURNAL J. Virol. 61 (2), 570-578 (1987)
 MEDLINE 87112954
 REFERENCE 29 (sites)
 AUTHORS Muesing, M.A., Smith, D.H. and Capon, D.J.

TITLE Regulation of mRNA accumulation by a human immunodeficiency virus trans-activator protein
 JOURNAL Cell 48 (4), 691-701 (1987)
 MEDLINE 87131081
 REFERENCE 30 (sites)
 AUTHORS Nabel, G. and Baltimore, D.

TITLE An inducible transcription factor activates expression of human immunodeficiency virus in T cells
 JOURNAL Nature 326 (6114), 711-713 (1987)

MEDLINE 87173065
 REMARK Erratum:[Nature 1990 Mar 8;344(6262):178]
 REFERENCE 31 (sites)
 AUTHORS Fisher,A.G., Ensoli,B., Ivanoff,L., Chamberlain,M., Petteway,S.,
 Ratner,L., Gallo,R.C. and Wong-Staal,F.
 TITLE The sor gene of HIV-1 is required for efficient virus transmission
 in vitro
 JOURNAL Science 237 (4817), 888-893 (1987)
 MEDLINE 87292118
 REFERENCE 32 (sites)
 AUTHORS Patarca,R., Heath,C., Goldenberg,G.J., Rosen,C.A., Sodroski,J.G.,
 Haseltine,W.A. and Hansen,U.M.
 TITLE Transcription directed by the HIV long terminal repeat in vitro
 JOURNAL AIDS Res. Hum. Retroviruses 3 (1), 41-55 (1987)
 MEDLINE 87299195
 REFERENCE 33 (sites)
 AUTHORS Wong-Staal,F., Chanda,P.K. and Ghrayeb,J.
 TITLE Human immunodeficiency virus: the eighth gene
 JOURNAL AIDS Res. Hum. Retroviruses 3 (1), 33-39 (1987)
 MEDLINE 87299194
 REFERENCE 34 (bases 1 to 9635; 1 to 9635)
 AUTHORS Ratner,L., Fisher,A., Jagodzinski,L.L., Mitsuya,H., Liou,R.S.,
 Gallo,R.C. and Wong-Staal,F.
 TITLE Complete nucleotide sequences of functional clones of the AIDS
 virus
 JOURNAL AIDS Res. Hum. Retroviruses 3 (1), 57-69 (1987)
 MEDLINE 87299196
 REFERENCE 35 (bases 6225 to 8795)
 AUTHORS Reitz,M.S. Jr., Wilson,C., Naugle,C., Gallo,R.C. and
 Robert-Guroff,M.
 TITLE Generation of a neutralization-resistant variant of HIV-1 is due to
 selection for a point mutation in the envelope gene
 JOURNAL Cell 54 (1), 57-63 (1988)
 MEDLINE 88253426
 REFERENCE 36 (bases 790 to 2292)
 AUTHORS Pal,R., Reitz,M.S. Jr., Tschachler,E., Gallo,R.C.,
 Sarngadharan,M.G. and Veronese,F.D.
 TITLE Myristoylation of gag proteins of HIV-1 plays an important role in
 virus assembly
 JOURNAL AIDS Res. Hum. Retroviruses 6 (6), 721-730 (1990)
 MEDLINE 90303964
 REFERENCE 37 (sites)
 AUTHORS Ido,E., Han,H.P., Kezdy,F.J. and Tang,J.
 TITLE Kinetic studies of human immunodeficiency virus type 1 protease and
 its active-site hydrogen bond mutant A28S
 JOURNAL J. Biol. Chem. 266 (36), 24359-24366 (1991)
 MEDLINE 92105089
 COMMENT On Mar 25, 1997 this sequence version replaced gi:327742.
 [6] sites; tat mRNA and other transcript boundaries. [7] sites;
 tat mRNA.
 [8] sites; mRNA splice sites.
 [9] sites; 27K antigen cds.
 [5] sites; gp160 and gp120 coding sequences.
 [1] sites; regulatory sequences in the LTR.
 [(in) Weiss,R., Teich,N., Varmus,H. and Coffin,J. (Eds.);RNA Tumor
 Viruses, Secon] review; bases 1 to 9718.
 [15] sites; trans-activator function and TAR sequence. [19]

sites; pol coding sequence.
 [22] sites; 23K sor gene product.
 [23] sites; pol NH2-terminal region.
 [20] sites; sor 23K protein.
 [21] sites; sor 23K protein.
 [24] sites; Spl binding sites in the promoter region. [17] sites;
 acceptor and donor splice sites for tat and 27K. [10] sites;
 deletion mutants in the tat gene.
 [18] sites; env gene conserved/variable regions; separate entries.
 [16] sites; trs cds boundaries.
 [12] sites; trs cds boundaries.
 [11] sites; env gene conserved/variable regions; separate entries.
 [26] sites; tar or transactivator target.
 [13] sites; 3' orf mutations.
 [14] sites; pol p34 terminus.
 [31] sites; promoter, TAR, tat-III mutants.
 [32] sites; envelope protein epitopes.
 [33] sites; trs/art protein.
 [34] sites; inducible enhancer element.
 [27] revises [30].
 [29] sites; long terminal repeat.
 [28] sites; R orf.
 [35] sites; sor.

Sequence for [25] kindly provided in computer-readable form by
 L.Ratner, 19-AUG-1986.

The HXB2 sequence is being used as a reference genome for all the
 HIV entries because it has been derived from a demonstrably
 infectious clone. Hence not all of the 'sites' references above
 were concerned with this isolate.

FEATURES	Location/Qualifiers
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961	agacaaatac	tgggacagct	acaaccatcc	cttcagacag	gatcagaaga	acttagatca
1021	ttatataata	cagtagcaac	cctctattgt	gtgcatcaaa	ggatagagat	aaaagacacc
1081	aaggaagctt	tagacaagat	agaggaagag	caaaacaaaa	gtaagaaaaa	agcacagcaa
1141	gcagcagctg	acacaggaca	cagcaatcag	gtcagccaaa	attaccctat	agtgcagaac
1201	atccaggggc	aaatggtaca	tcaggccata	tcacctagaa	ctttaaatgc	atgggtaaaa
1261	gtagtagaag	agaaggcttt	cagcccagaa	gtgataccca	tgttttcagc	attatcagaa
1321	ggagccaccc	cacaagattt	aaacaccatg	ctaaacacag	tggggggaca	tcaagcagcc
1381	atgcaaatgt	taaaagagac	catcaatgag	gaagctgcag	aatgggatag	agtgcattca
1441	gtgcatgcag	ggcctattgc	accaggccag	atgagagaac	caaggggaag	tgacatagca
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1681	gaccggttct	ataaaactct	aagagccgag	caagcttcac	aggaggtaaa	aaattggatg
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1921	atgcagagag	gcaatttttag	gaaccaaaga	aagattgtta	agtgtttcaa	ttgtggcaaa
1981	gaagggcaca	cagccagaaa	ttgcagggcc	cctaggaaaa	agggctgttg	gaaatgtgga
2041	aagggaaggac	accaaatgaa	agattgtact	gagagacagg	ctaatttttt	agggaagatc
2101	tggccttcct	acaagggaag	gccagggaat	tttcttcaga	gcagaccaga	gccaacagcc
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2281	tcgtcacaat	aaagataggg	gggcaactaa	aggaagctct	attagataca	ggagcagatg
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2761	ggagaaaatt	agtagatttc	agagaactta	ataagagaac	tcaagacttc	tgggaagtgc
2821	aattaggaat	accacatccc	gcagggttaa	aaaagaaaaa	atcagtaaca	gtactggatg
2881	tgggtgatgc	atatttttca	gttcccttag	atgaagactt	caggaagtat	actgcattta
2941	ccatacctag	tataaacaat	gagacaccag	ggattagata	tcagtacaat	gtgcttccac
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3061	ttagaaaaca	aaatccagac	atagttatct	atcaatacat	ggatgatttg	tatgtaggat
3121	ctgacttaga	aatagggcag	catagaacaa	aaatagagga	gctgagacaa	catctgttga
3181	ggtggggact	taccacacca	gacaaaaaac	atcagaaaga	acctccattc	ctttggatgg
3241	gttatgaact	ccatcctgat	aaatggacag	tacagcctat	agtgtgtcca	gaaaaagaca
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3361	accaggggat	taaagtaagg	caattatgta	aactccttag	aggaacccaa	gcactaacag
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3661	cagtgcacaaa	aataaccaca	gaaagcatag	taatattggg	aaagactcct	aaatttaaac
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3901	aattaggaaa	agcaggatat	gttactaata	gaggaagaca	aaaagttgtc	accctaactg
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4081	atcaaagtga	atcagagtta	gtcaatcaaa	taatagagca	gttaataaaa	aaggaaaagg
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4441	aagttatcct	ggtagcagtt	catgtagcca	gtggatata	agaagcagaa	gttattccag
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4681	tagaatctat	gaataaagaa	ttaaagaaaa	ttataggaca	ggtaagagat	caggctgaac
4741	atcttaagac	agcagtacaa	atggcagtat	tcattccaca	ttttaaaaga	aaagggggga
4801	ttggggggta	cagtgcaggg	gaaagaatag	tagacataat	agcaacagac	atacaaaacta
4861	aagaattaca	aaaacaaatt	acaaaaattc	aaaattttcg	ggtttattac	agggacagca
4921	gaaatccact	ttggaaagga	ccagcaaacg	tcctctggaa	aggtgaagg	gagtagtaa
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5221	gatgctagat	tggtaataac	aacatattgg	ggtctgcata	caggagaaag	agactggcat
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5341	gaactagcag	accaactaat	tcattctgtat	tactttgact	gtttttcaga	ctctgctata
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5581	aagggccaca	gagggagcca	cacaatgaat	ggacactaga	gcttttagag	gagcttaaga
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6121	agttgtgtgg	tccatagtaa	tcatagaata	taggaaaata	ttaagacaaa	gaaaaataga
6181	caggtttaatt	gatagactaa	tagaaagagc	agaagacagt	ggcaatgaga	gtgaaggaga
6241	aatatcagca	cttgtggaga	tgggggtgga	gatggggcac	catgctcctt	gggatgttga
6301	tgatctgtag	tgctacagaa	aaattgtggg	tcacagtcta	ttatggggta	cctgtgtgga
6361	aggaagcaac	caccactcta	ttttgtgcat	cagatgctaa	agcatatgat	acagaggtag
6421	ataatgtttg	ggccacacat	gcctgtgtac	ccacagaccc	caaccacaaa	gaagtagtat
6481	tggtaaatgt	gacagaaaat	tttaacatgt	ggaaaaatga	catggtagaa	cagatgcatg
6541	aggatataat	cagtttatgg	gatcaaagcc	taaagccatg	tgtaaaatta	acccactct
6601	gtgttagttt	aaagtgcact	gatttgaaga	atgatactaa	taccaatagt	agtagcggga
6661	gaatgataat	ggagaaagga	gagataaaaa	actgctcttt	caatatcagc	acaagcataa
6721	gaggtaagg	gcagaaagaa	tatgcatttt	tttataaact	tgatataata	ccaatagata
6781	atgatactac	cagctataag	ttgacaagtt	gtaacacctc	agtcattaca	caggcctgtc
6841	caaaggatatc	ctttgagcca	attcccatac	attattgtgc	cccggctggt	tttgcgattc
6901	taaaatgtaa	taataagacg	ttcaatggaa	caggaccatg	tacaaatgtc	agcacagtac
6961	aatgtacaca	tggaaattagg	ccagtagtat	caactcaact	gctgttaaat	ggcagcttag
7021	cagaagaaga	ggtagtaatt	agatctgtca	atttcacgga	caatgctaaa	accataatag
7081	tacagctgaa	cacatctgta	gaaattaatt	gtacaagacc	caacaacaat	acaagaaaaa
7141	gaatccgtat	ccagagagga	ccagggagag	catttgttac	aataggaaaa	ataggaaata
7201	tgagacaagc	acattgtaac	attagtagag	caaaatggaa	taacacttta	aaacagatag
7261	ctagcaaatt	aagagaacaa	tttggaaata	ataaaacaat	aatctttaag	caatcctcag

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7321 gaggggaccc agaaattgta acgcacagtt ttaattgtgg aggggaattt ttctactgta
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7441 ataacactga aggaagtgcac acaatcaccc tcccatgcag aataaaacaa attataaaca
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7621 agatcttcag acctggagga ggagatatga gggacaattg gagaagtga tttatataaat
7681 ataaagtagt aaaaattgaa ccattaggag tagcaccacac caaggcaaa agaaagagtgg
7741 tgcagagaga aaaaagagca gtgggaatag gagctttgtt ccttgggttc ttgggagcag
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8161 ttgaagaatc gcaaaaaccag caagaaaaga atgaacaaga attattggaa ttagataaat
8221 gggcaagttt gtggaattgg tttaacataa caaattggct gtggtatata aaattattca
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8401 gacccgacag gcccgaaagga atagaagaag aaggtggaga gagagacaga gacagatcca
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8521 tcagctacca ccgcttgaga gacttactct tgattgtaac gaggattgtg gaacttctgg
8581 gacgcagggg gtgggaagcc ctcaaataat ggtggaatct cctacagtat tggagtcagg
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9121 atccttgatc tgtggatcta ccacacacaa ggctacttcc ctgattagca gaactacaca
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9661 tgactctggt aactagagat ccctcagacc cttttagtag gtgtggaaaa tctctagca

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The oligonucleotide probe for Ap-1 sequence in step 63, of original application, was synthesized using PMA responsive element as consensus sequence as indicated by the reference of Northrop et al., 1993, and adding flanking sequences.

These two sequences which were used as probes are representative example to demonstrate the methodology of DNA-protein interaction. Any other relevant sequence(s) can be used for this purpose as **Claim 4** has been amended by the Examiner..